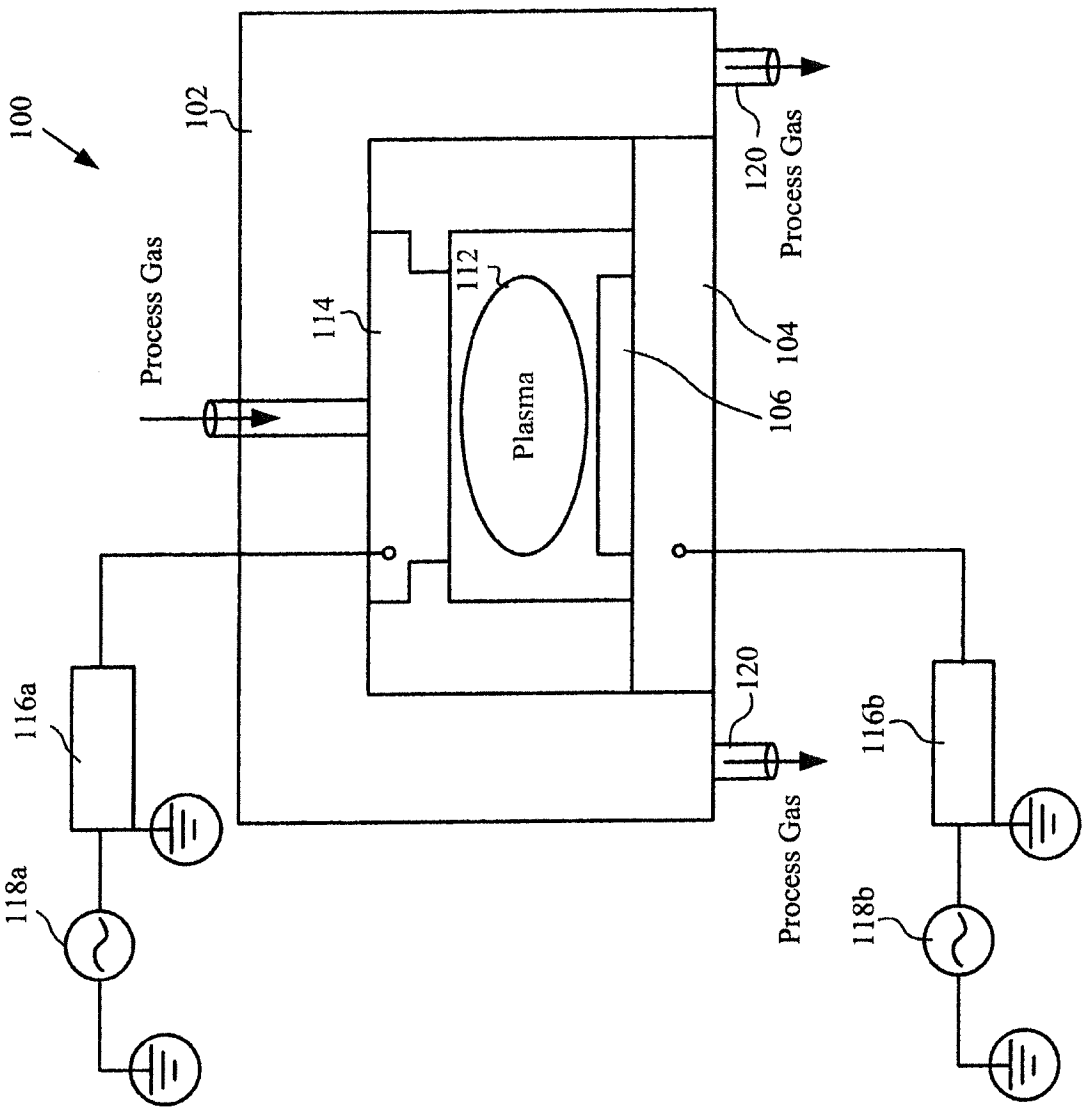
Figure 1


100
102
Process Gas
114
112
Plasma
104
106
120
Process Gas
120
Process Gas
116a
116b
118a
118b

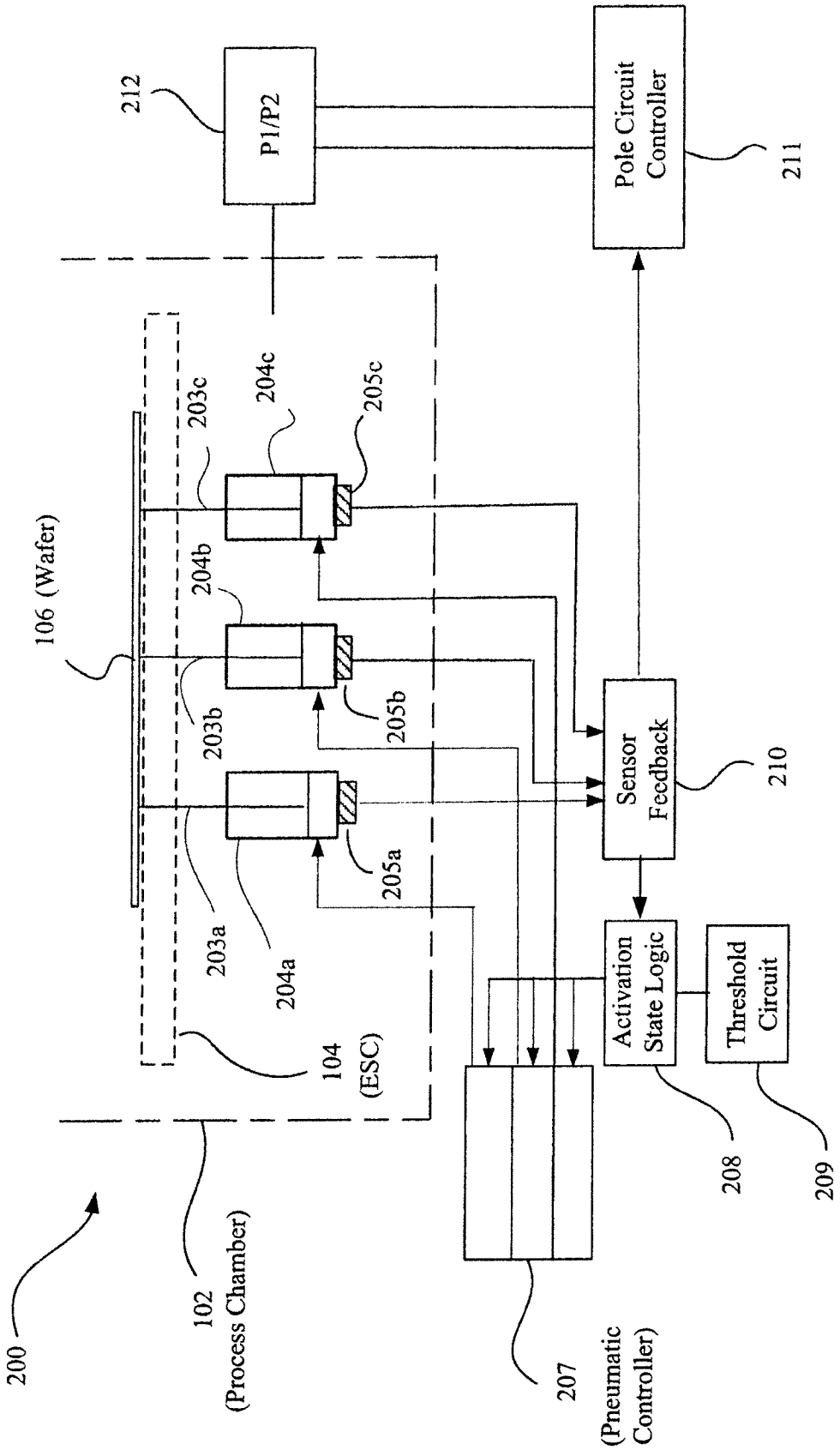

212
P1/P2
Pole Circuit Controller
211
203c
204c
205c
106 (Wafer)
204b
203b
205b
Sensor Feedback
210
205a
203a
204a
Activation State Logic
Threshold Circuit
104 (ESC)
208
209
200
102 (Process Chamber)
207 (Pneumatic Controller)

Figure 2

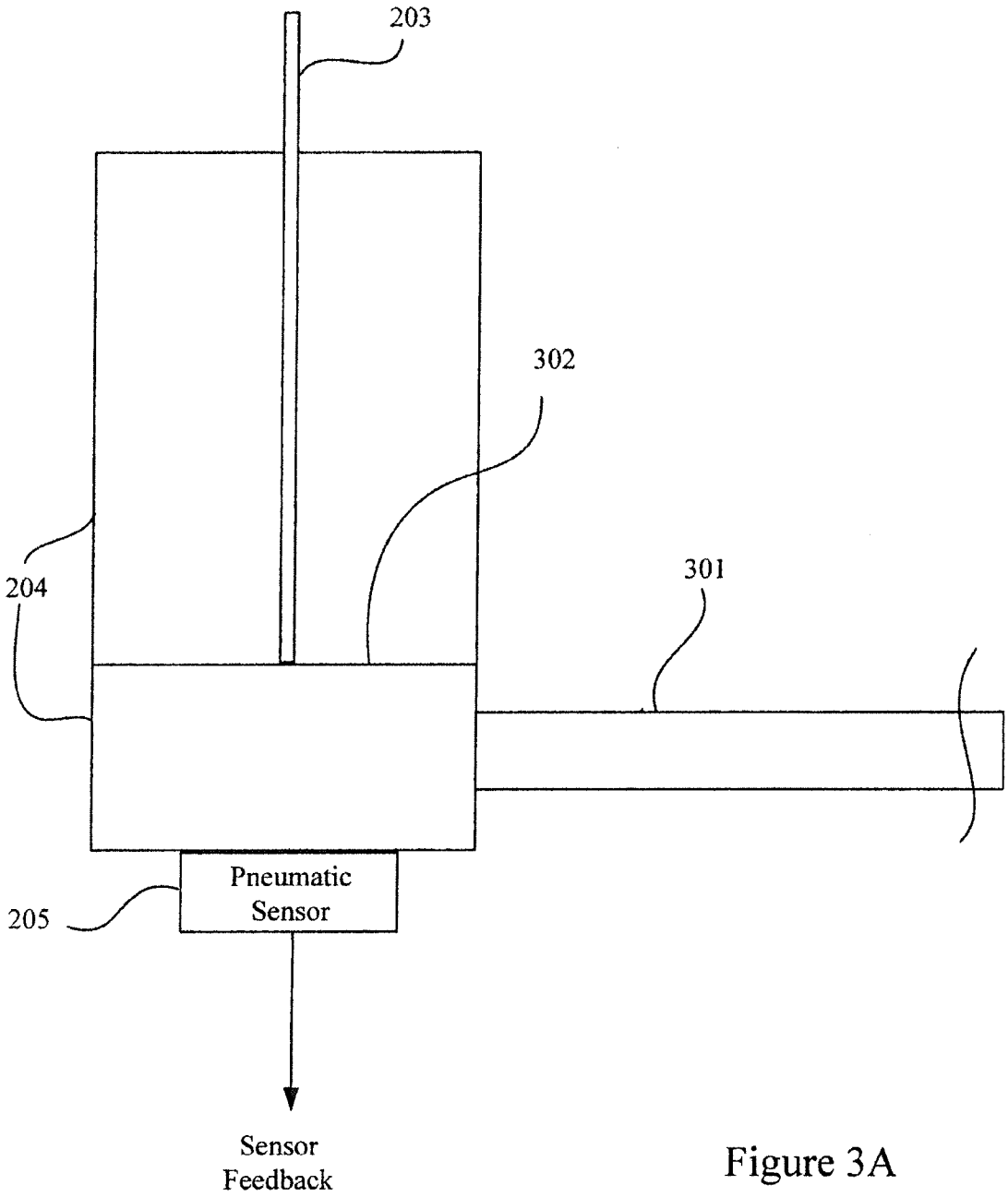


Figure 3A

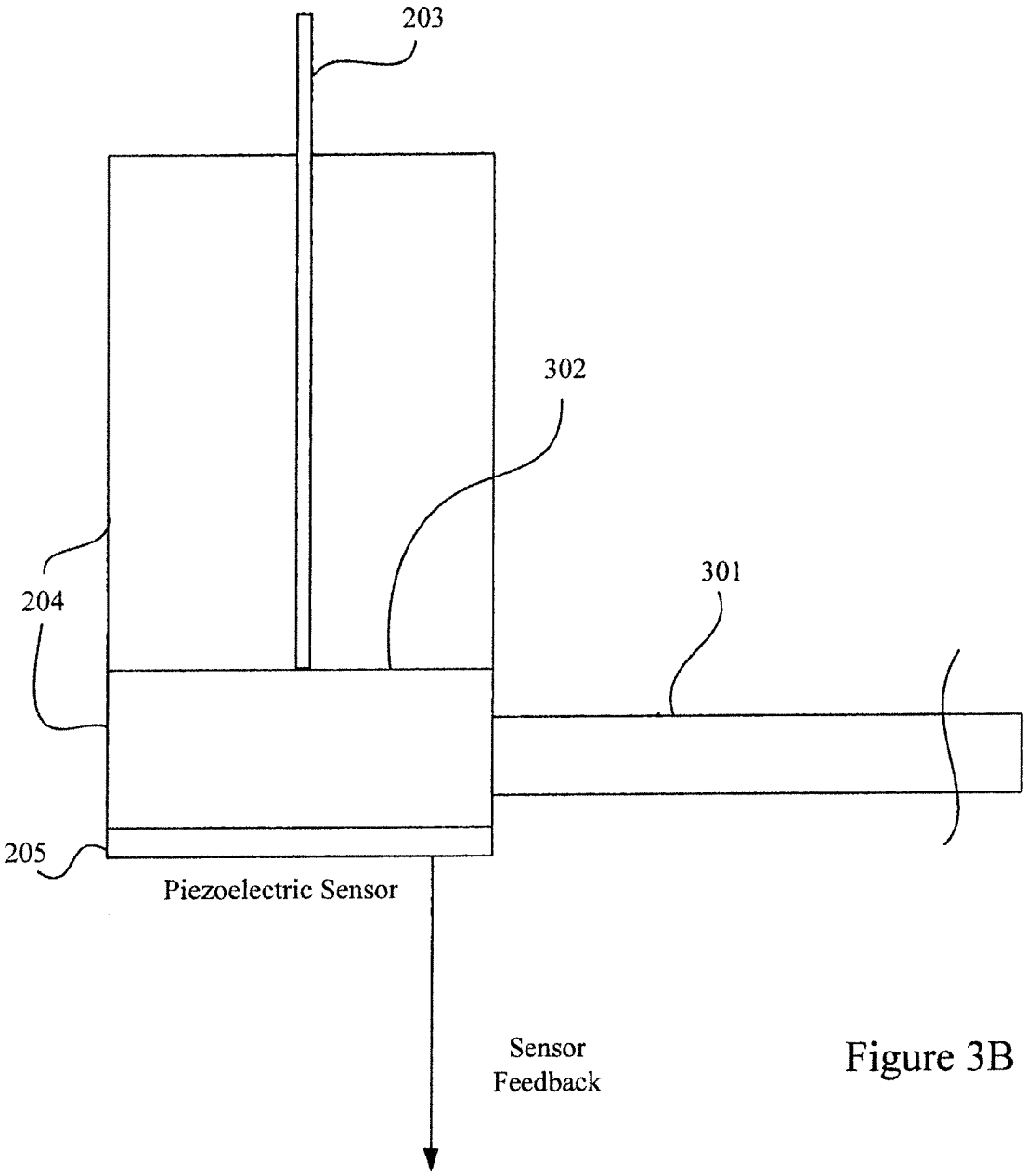


Figure 3B

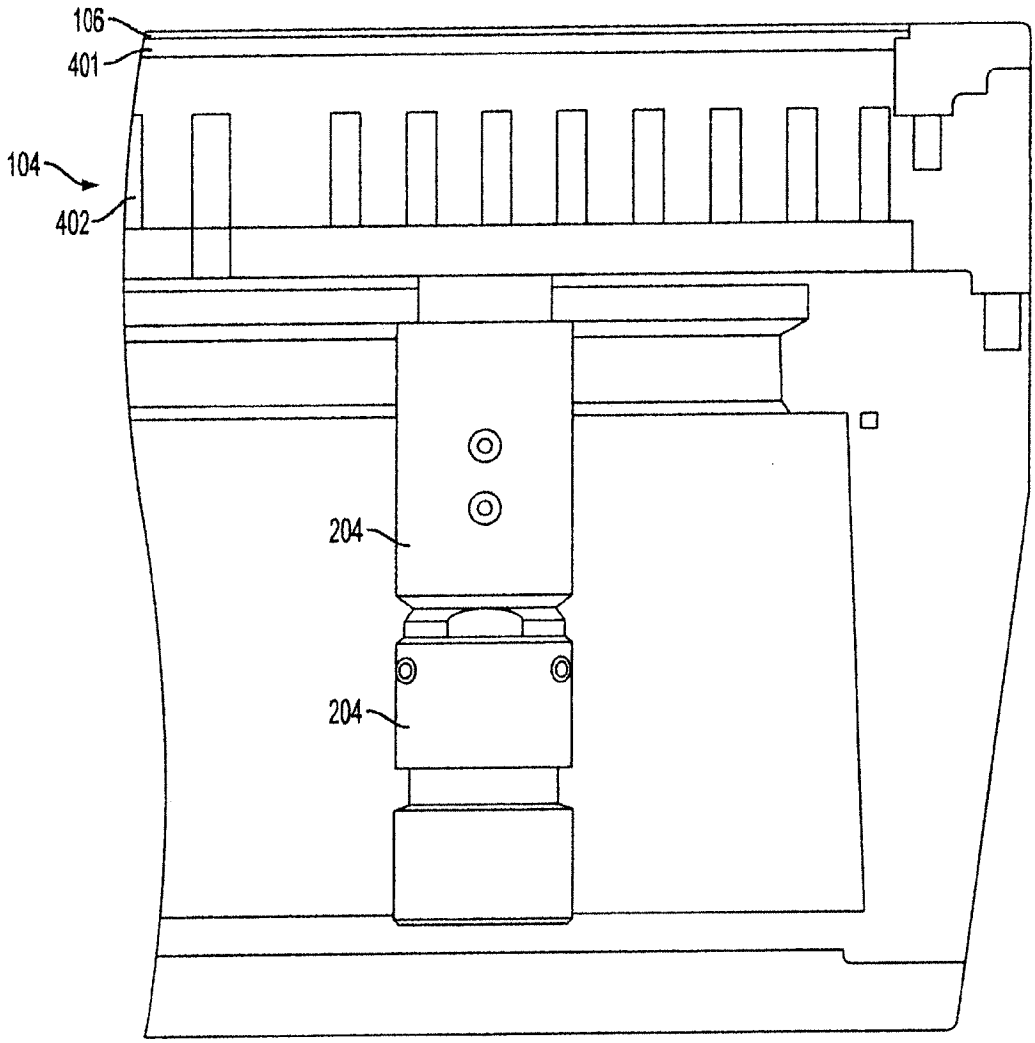


FIG. 4A

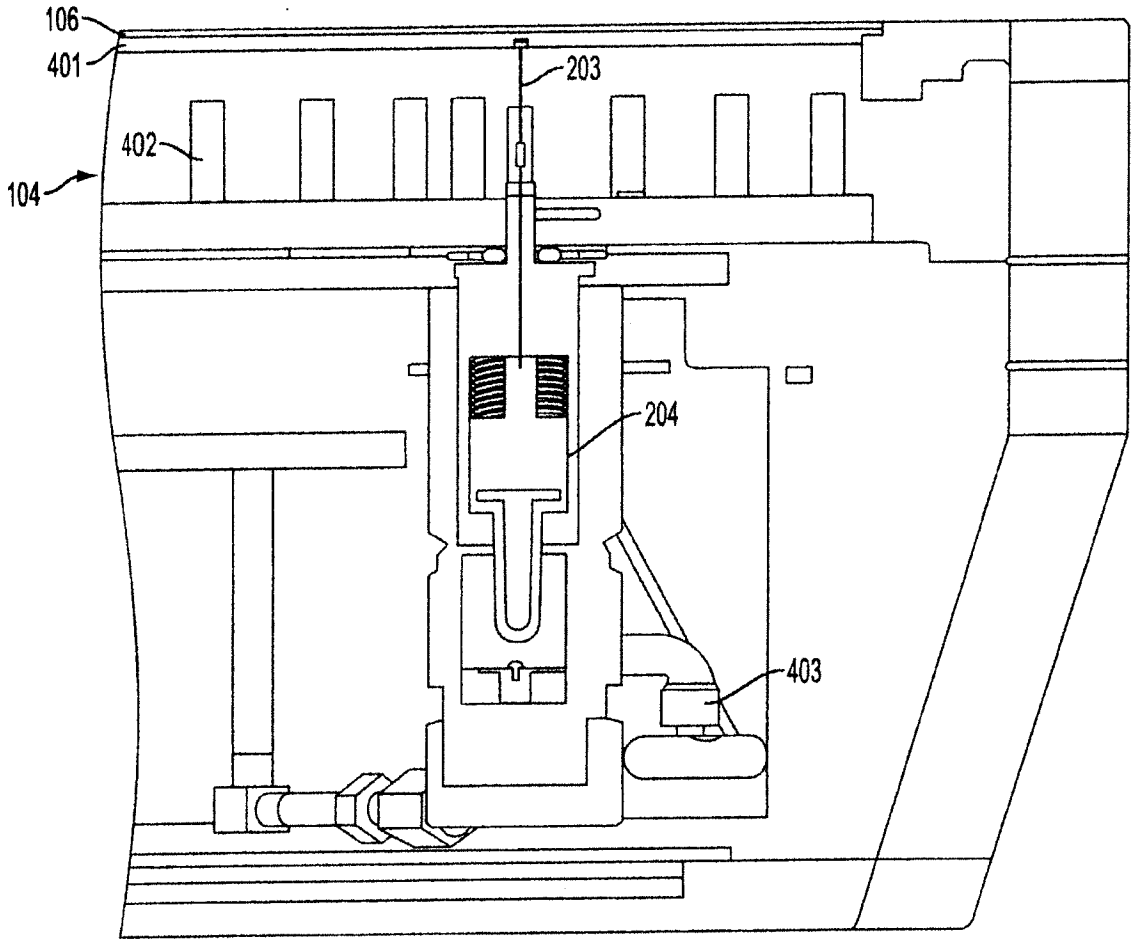


FIG. 4B

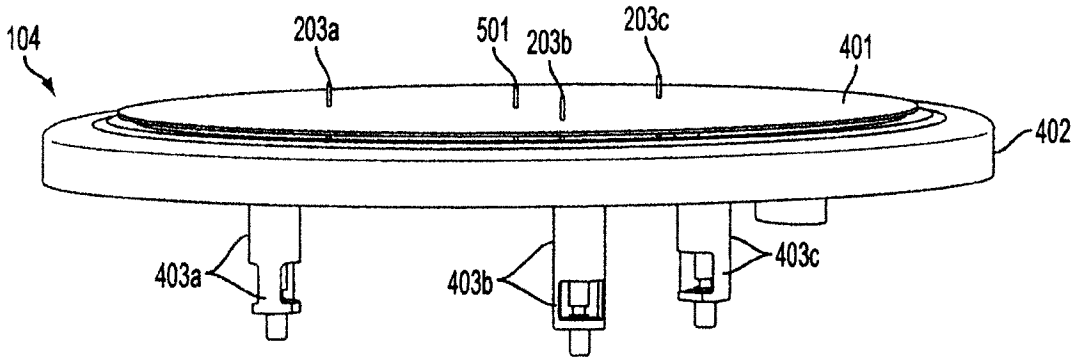


FIG. 5

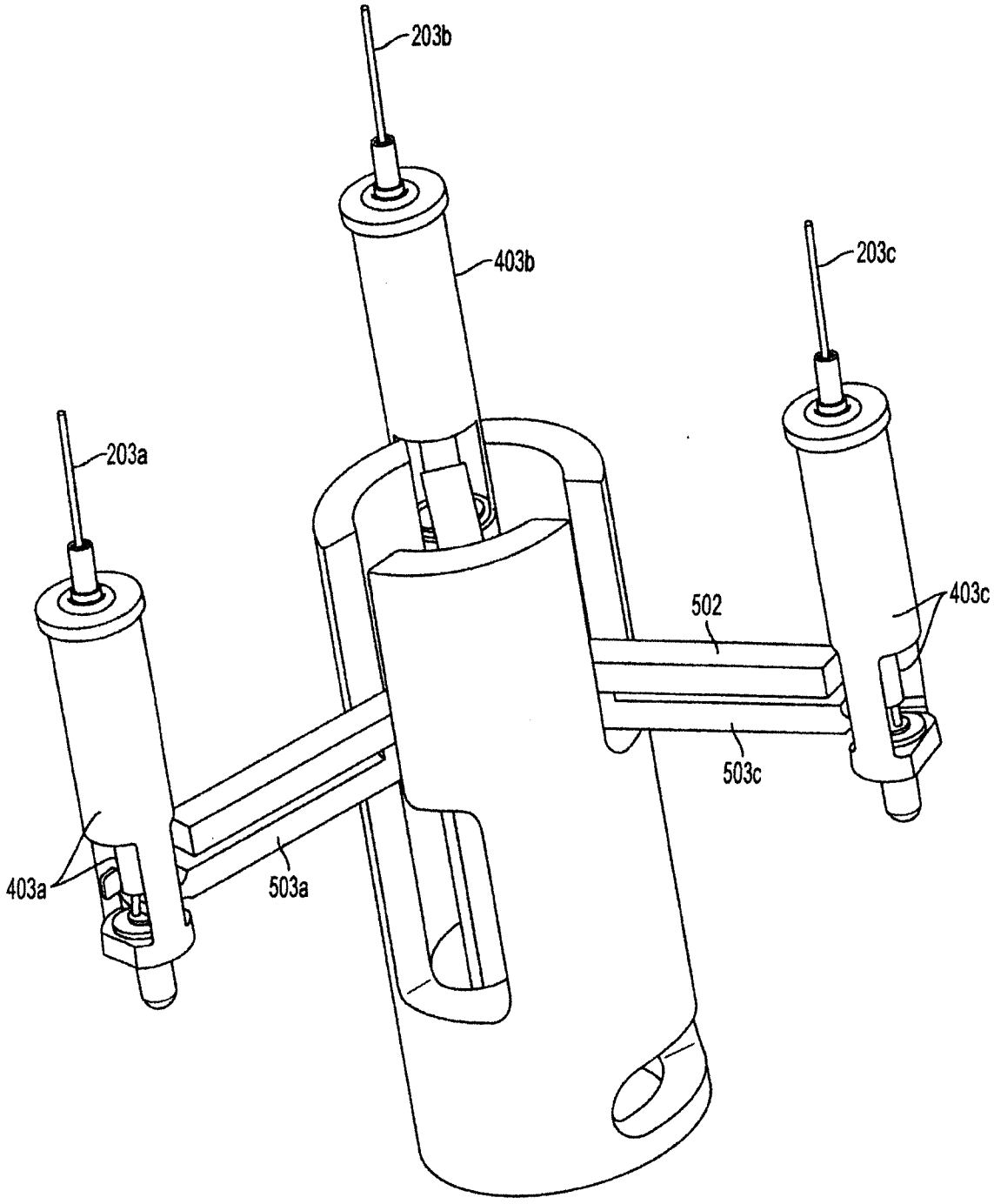


FIG. 6

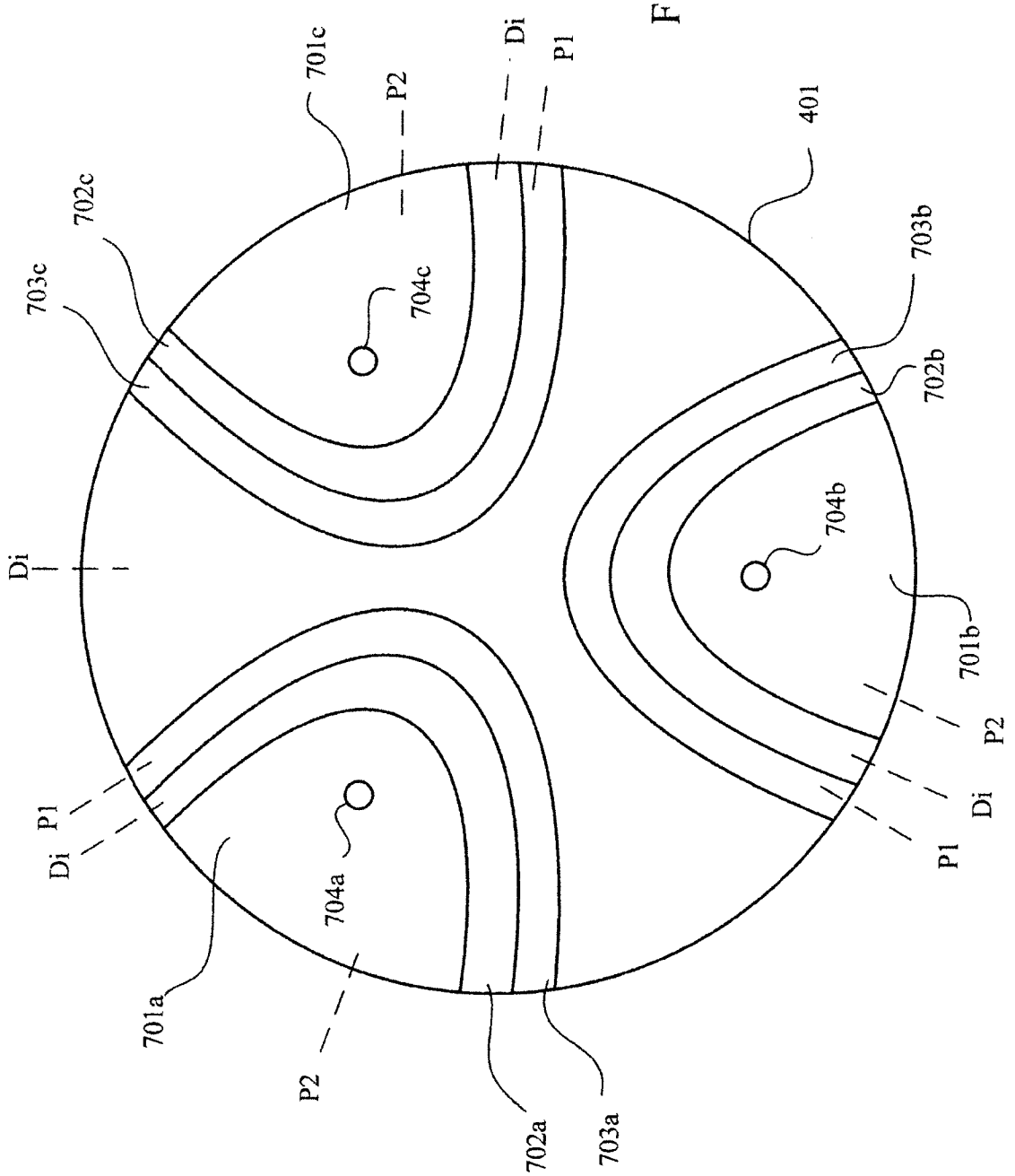

701c
P2
Di
P1
401
703b
702c
703c
704c
702b
Di
704b
701b
P1
Di
P2
P1
Di
704a
701a
P2
702a
703a

Figure 7

Figure 8

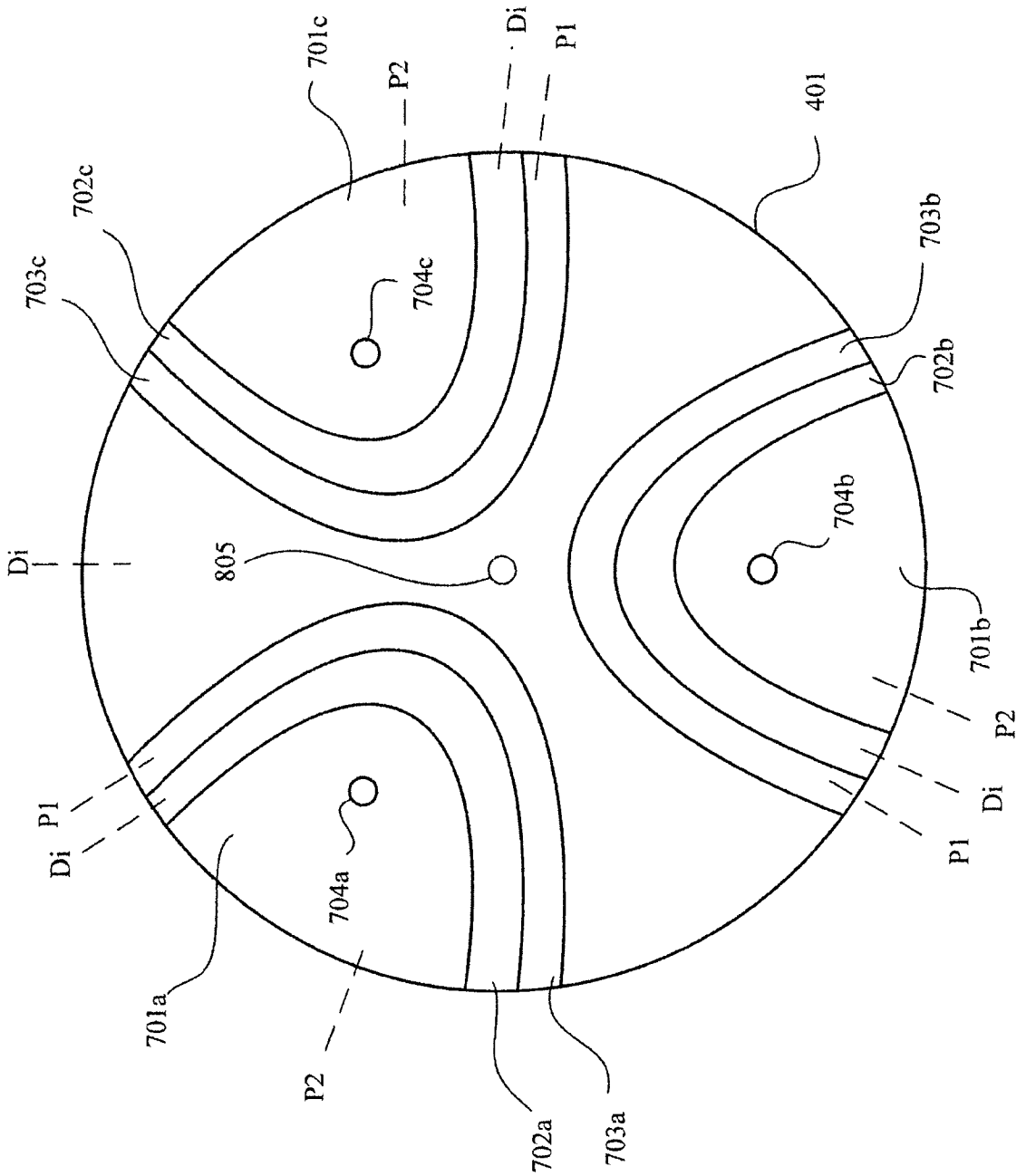
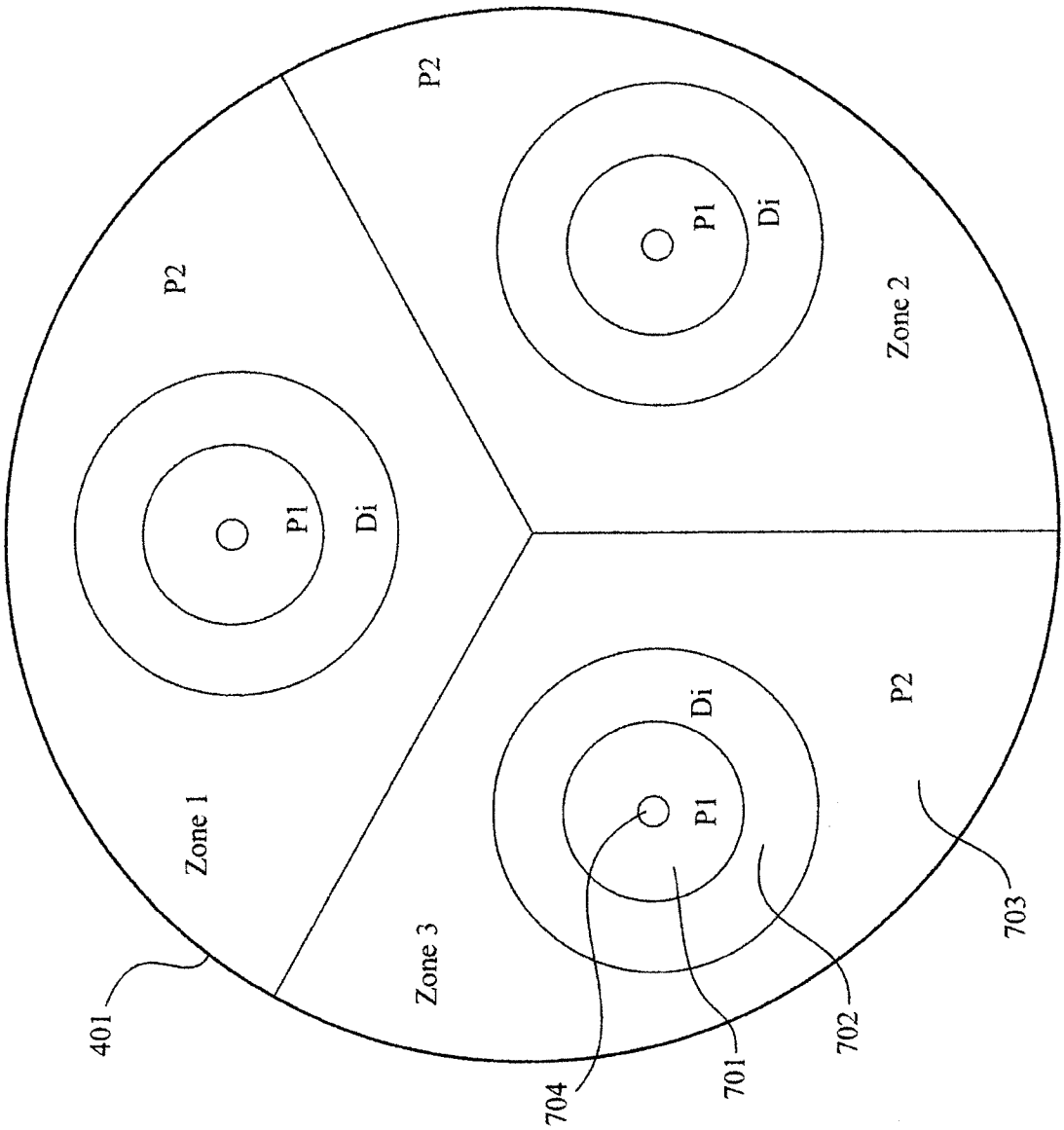

701c
P2
Di
P1
401
703b
702b
704b
701b
P2
Di
P1
702c
703c
704c
805
Di
P1
Di
704a
701a
P2
702a
703a

Figure 9



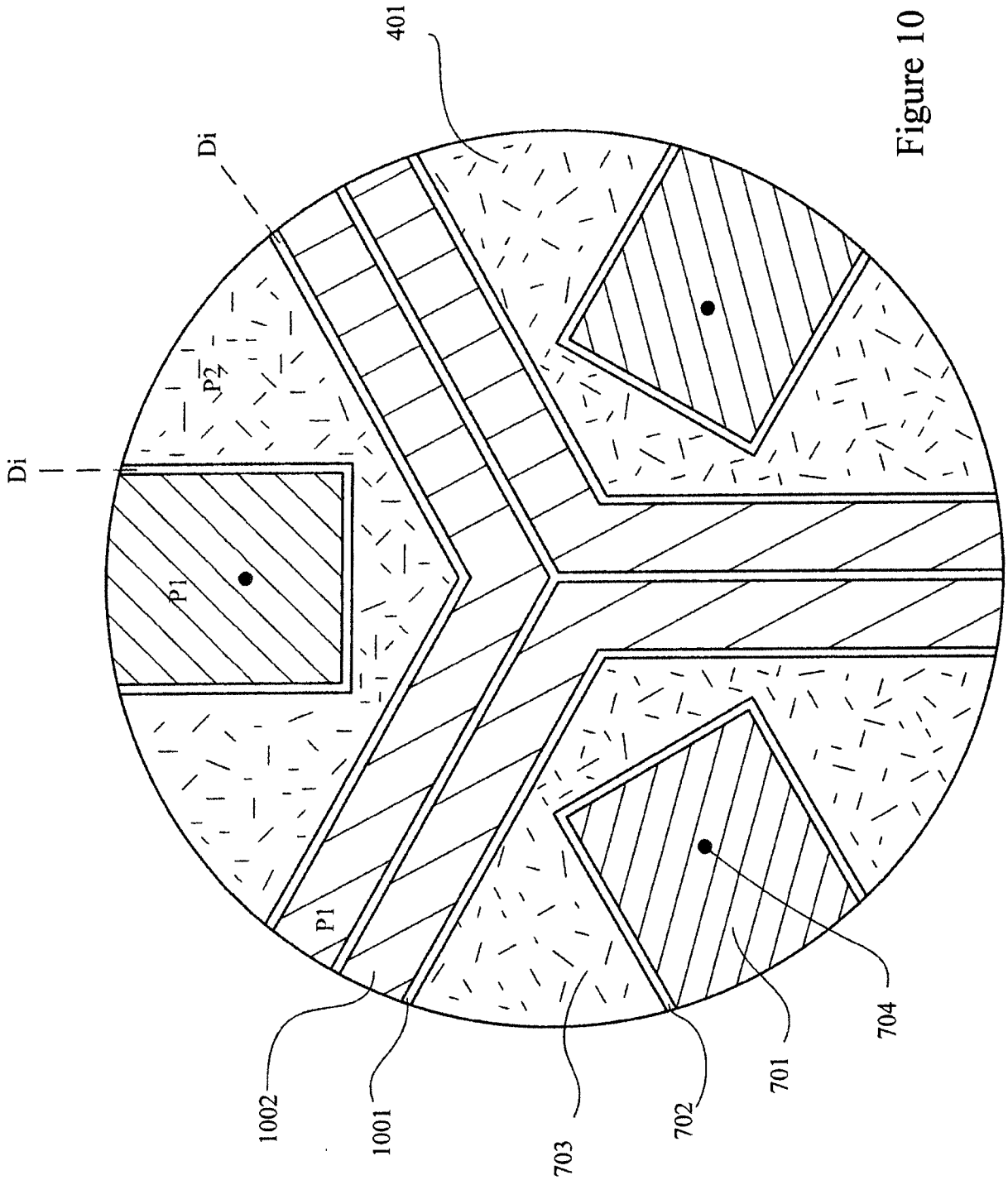


Figure 10

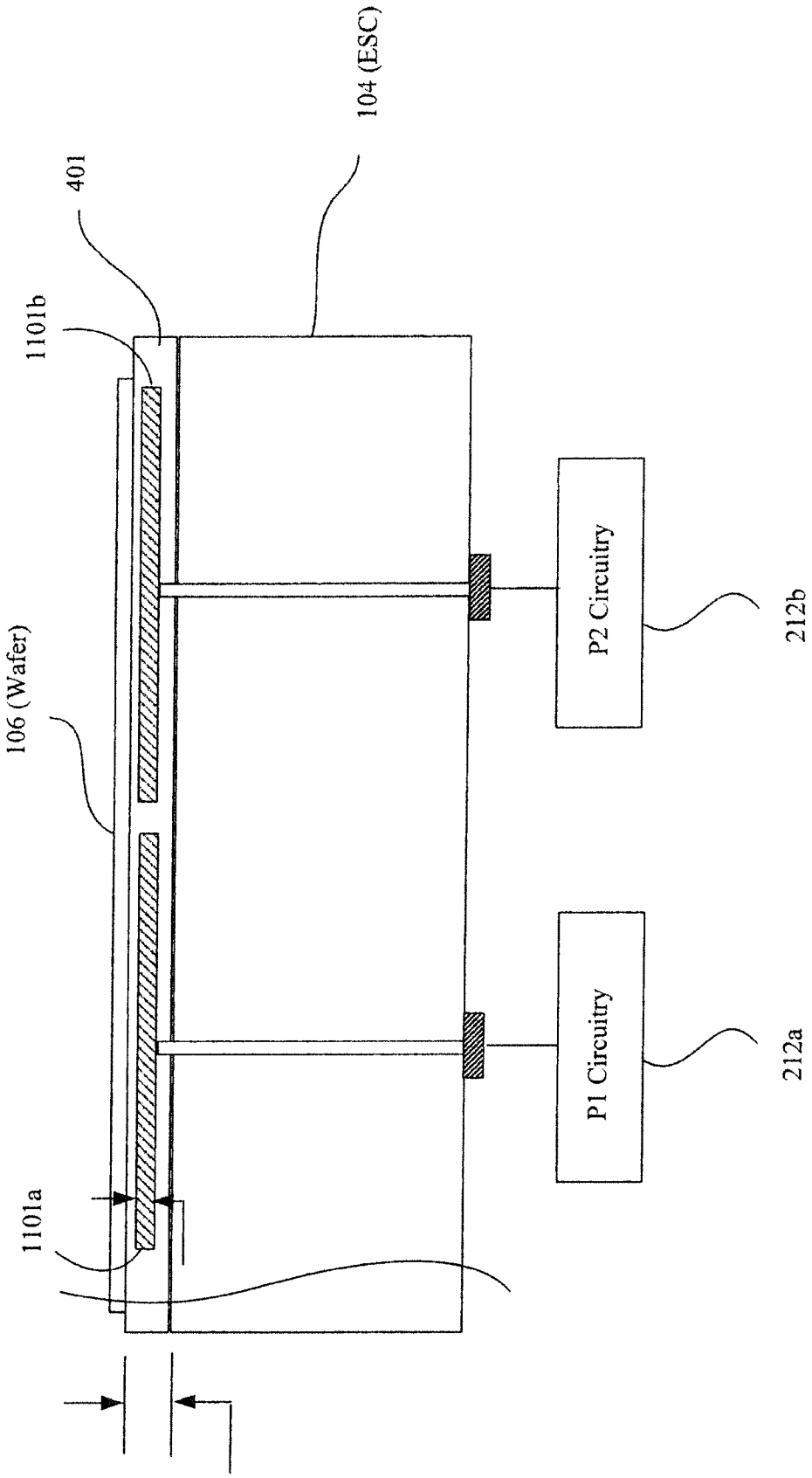

104 (ESC)
401
1101b
106 (Wafer)
P2 Circuitry
212b
P1 Circuitry
212a
1101a

Figure 11A

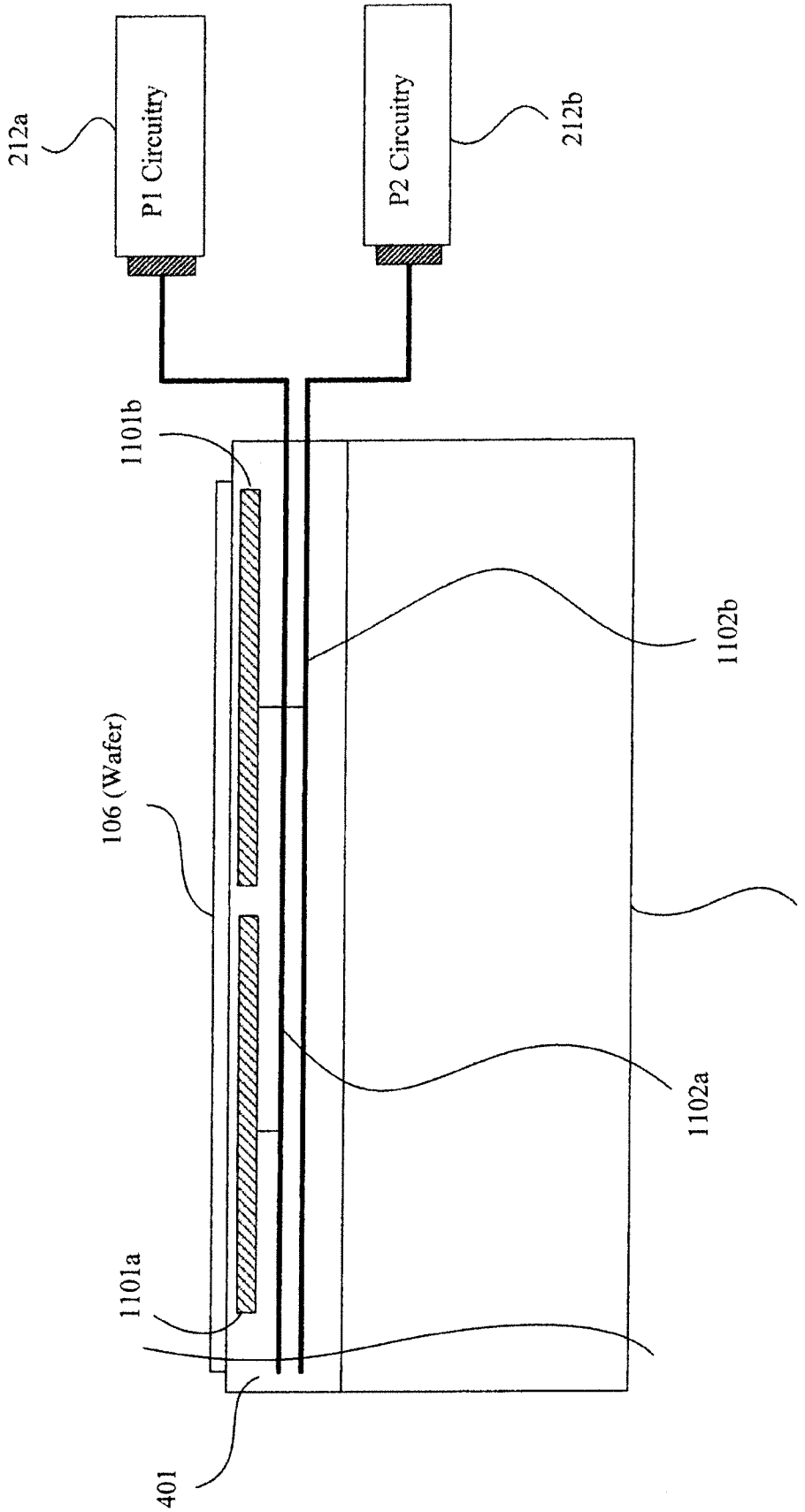

212a
P1 Circuitry
P2 Circuitry
212b
1101b
1102b
106 (Wafer)
104 (ESC)
1102a
1101a
401

Figure 11B

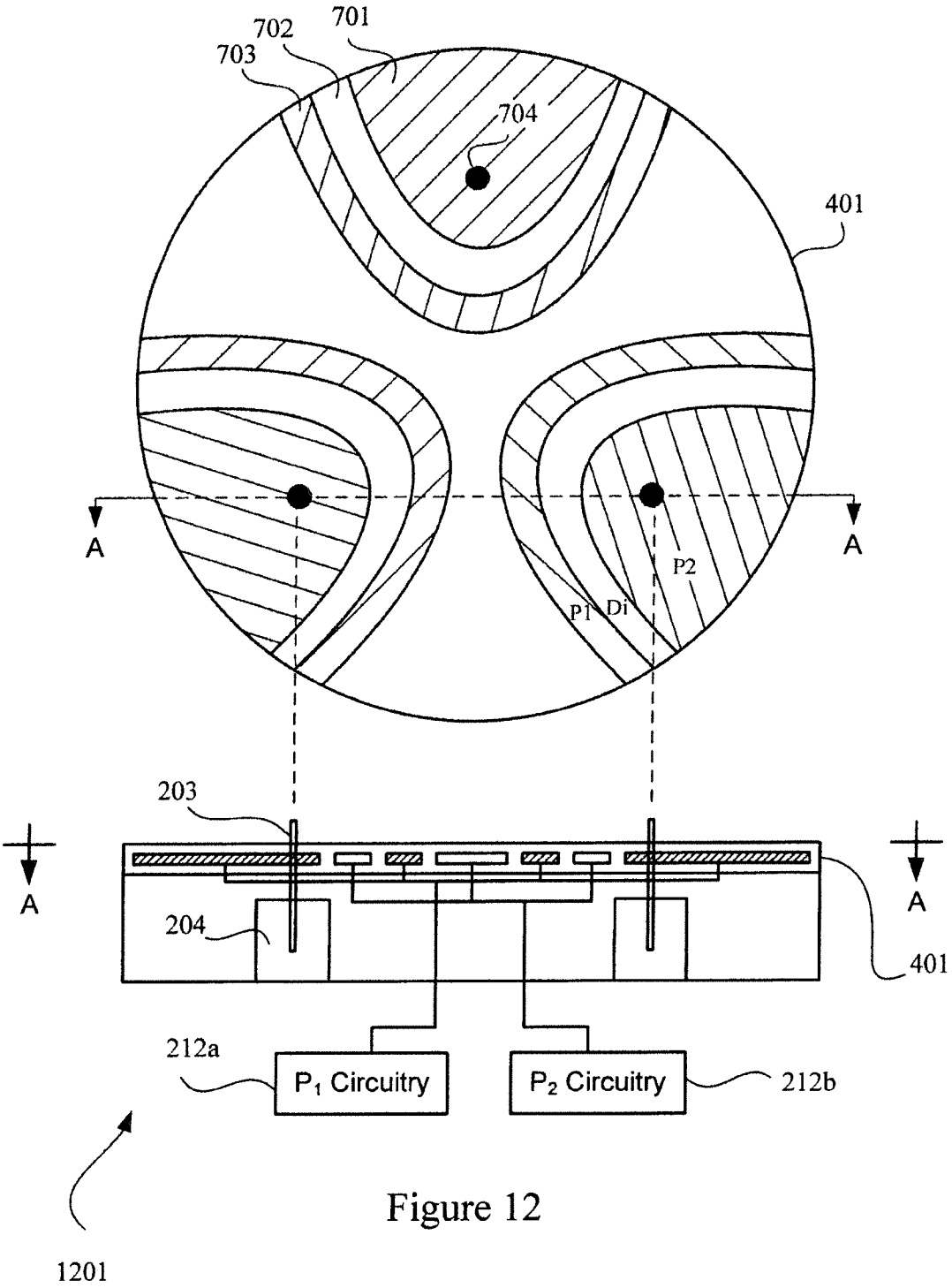

701
702
703
704
401
A
A
P2
P1
Di
203
A
A
204
401
212a
P1 Circuitry
P2 Circuitry
212b
1201

Figure 12

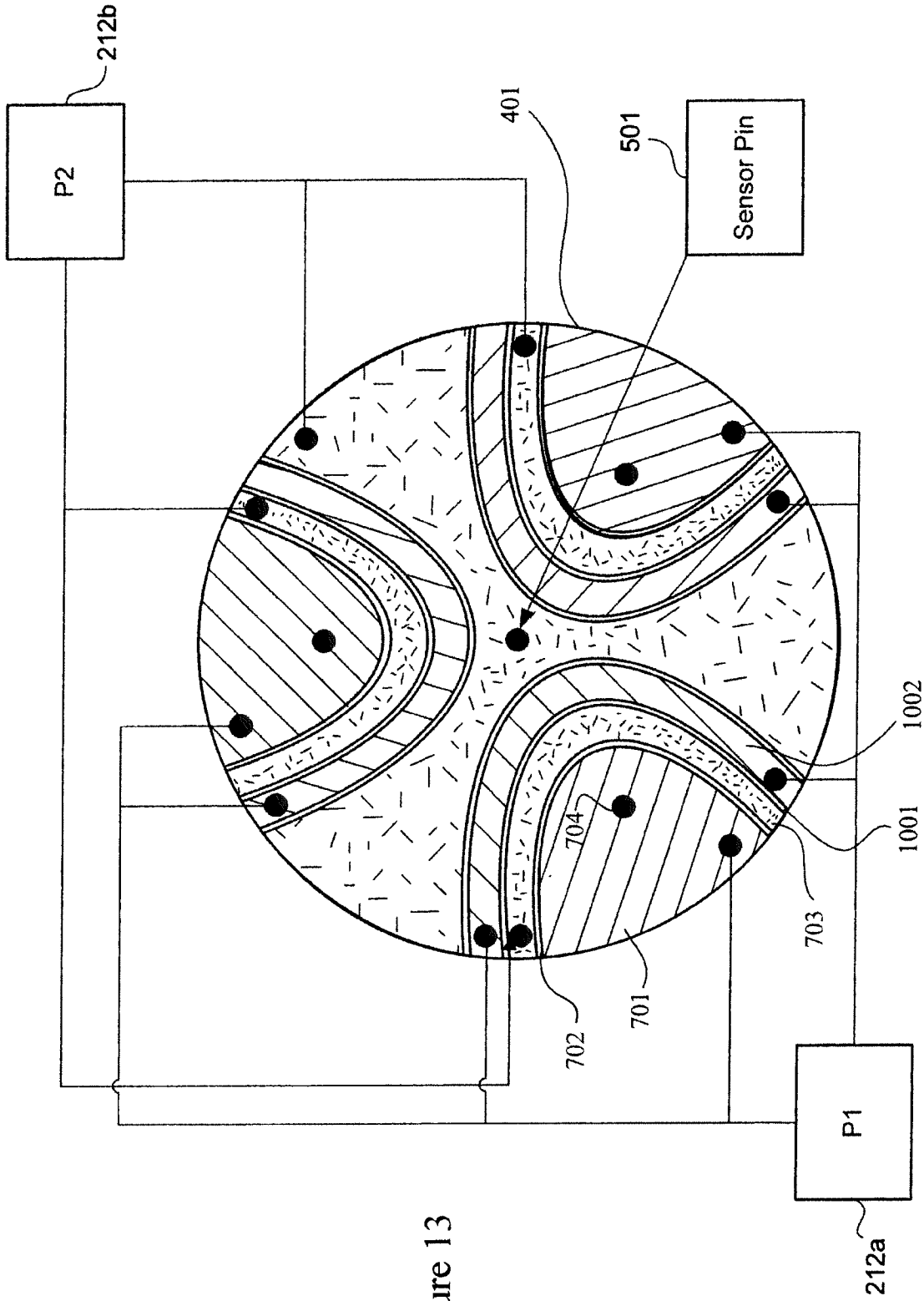
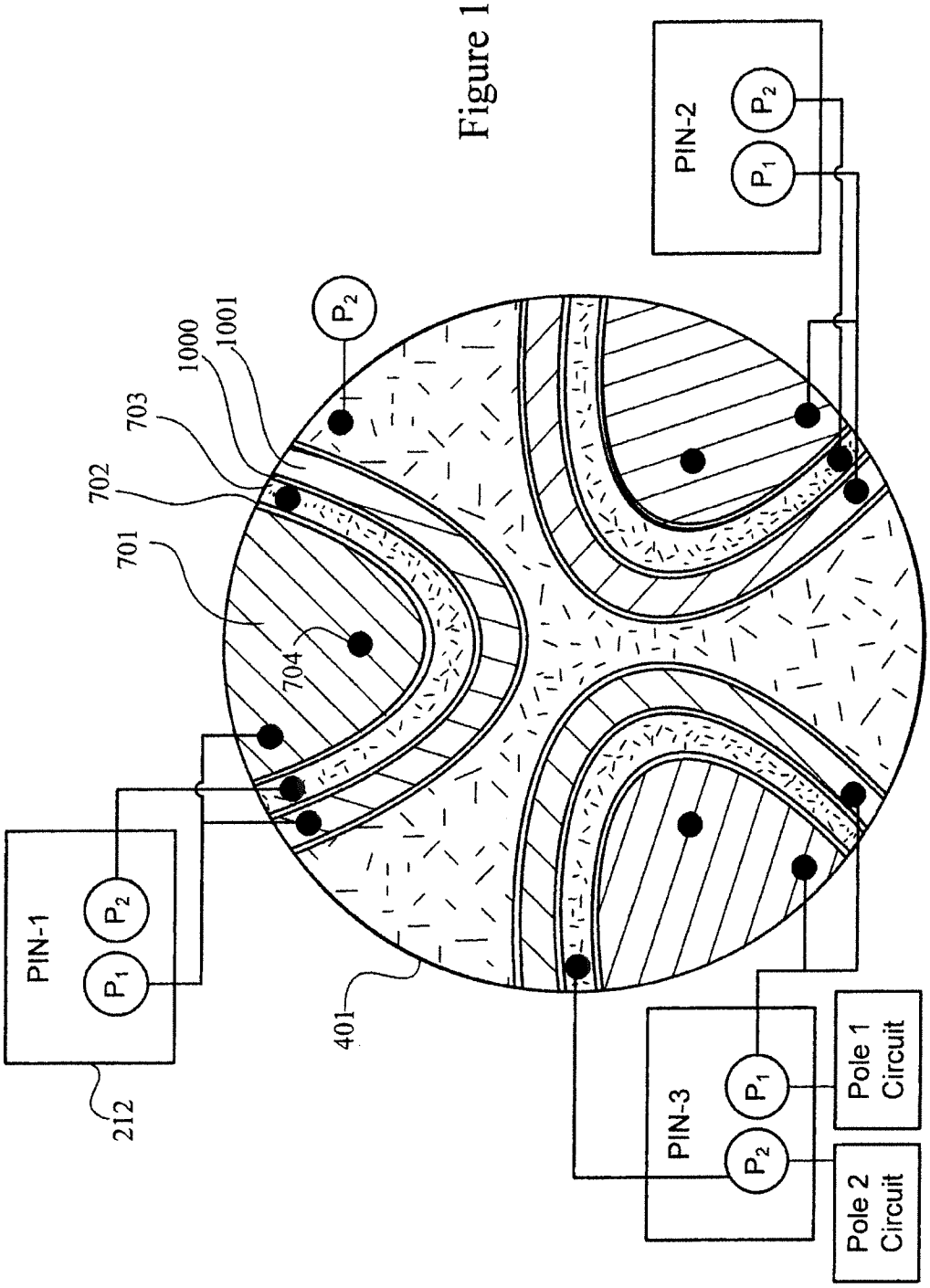


Figure 13

Figure 14


PIN-1
P2
P1
212
PIN-2
P2
P1
PIN-3
P1
P2
Pole 1 Circuit
Pole 2 Circuit
401
704
701
702
703
1000
1001
P2

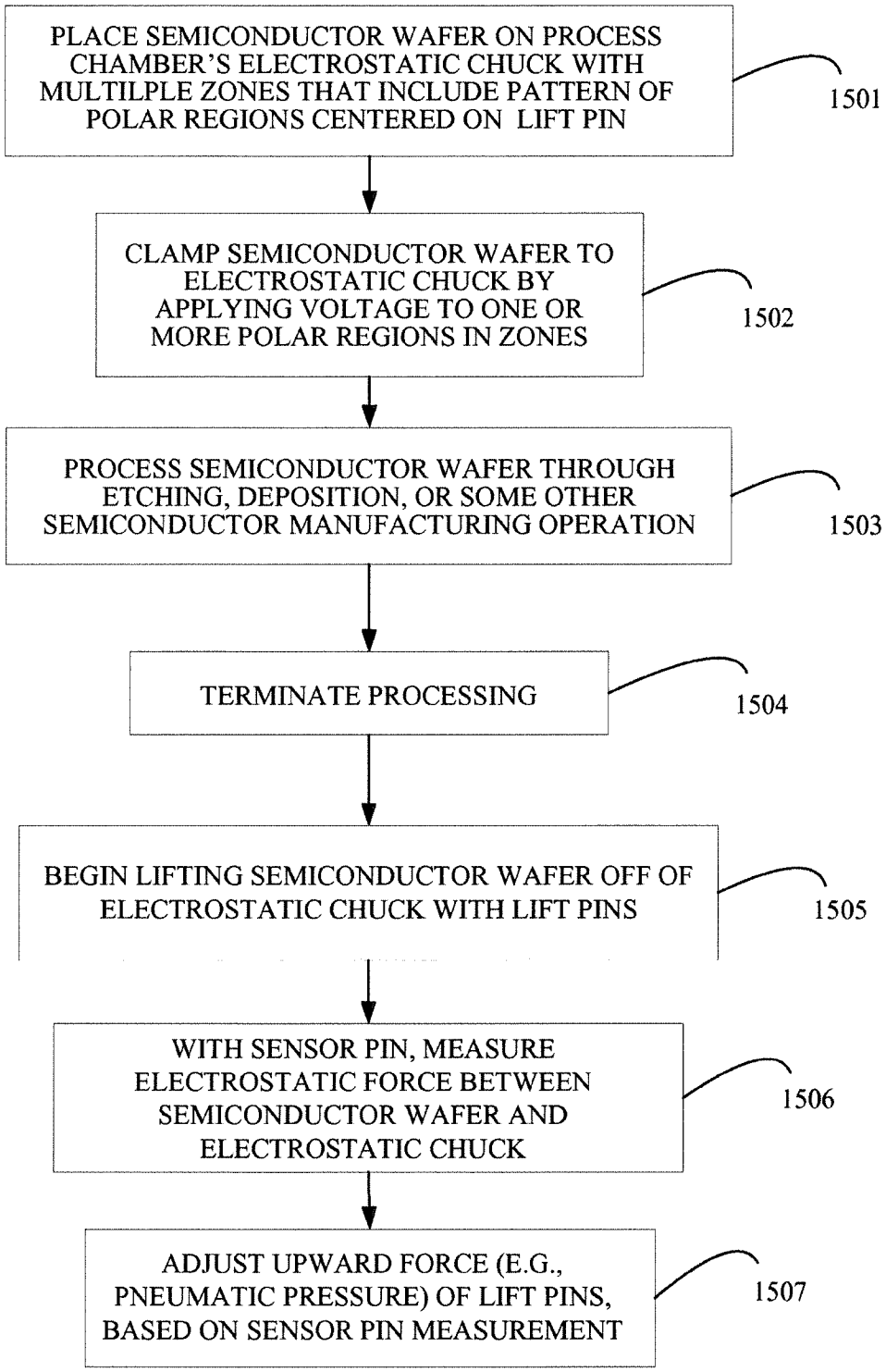

PLACE SEMICONDUCTOR WAFER ON PROCESS CHAMBER'S ELECTROSTATIC CHUCK WITH MULTILPLE ZONES THAT INCLUDE PATTERN OF POLAR REGIONS CENTERED ON LIFT PIN
1501
CLAMP SEMICONDUCTOR WAFER TO ELECTROSTATIC CHUCK BY APPLYING VOLTAGE TO ONE OR MORE POLAR REGIONS IN ZONES
1502
PROCESS SEMICONDUCTOR WAFER THROUGH ETCHING, DEPOSITION, OR SOME OTHER SEMICONDUCTOR MANUFACTURING OPERATION
1503
TERMINATE PROCESSING
1504
BEGIN LIFTING SEMICONDUCTOR WAFER OFF OF ELECTROSTATIC CHUCK WITH LIFT PINS
1505
WITH SENSOR PIN, MEASURE ELECTROSTATIC FORCE BETWEEN SEMICONDUCTOR WAFER AND ELECTROSTATIC CHUCK
1506
ADJUST UPWARD FORCE (E.G., PNEUMATIC PRESSURE) OF LIFT PINS, BASED ON SENSOR PIN MEASUREMENT
1507

Figure 15

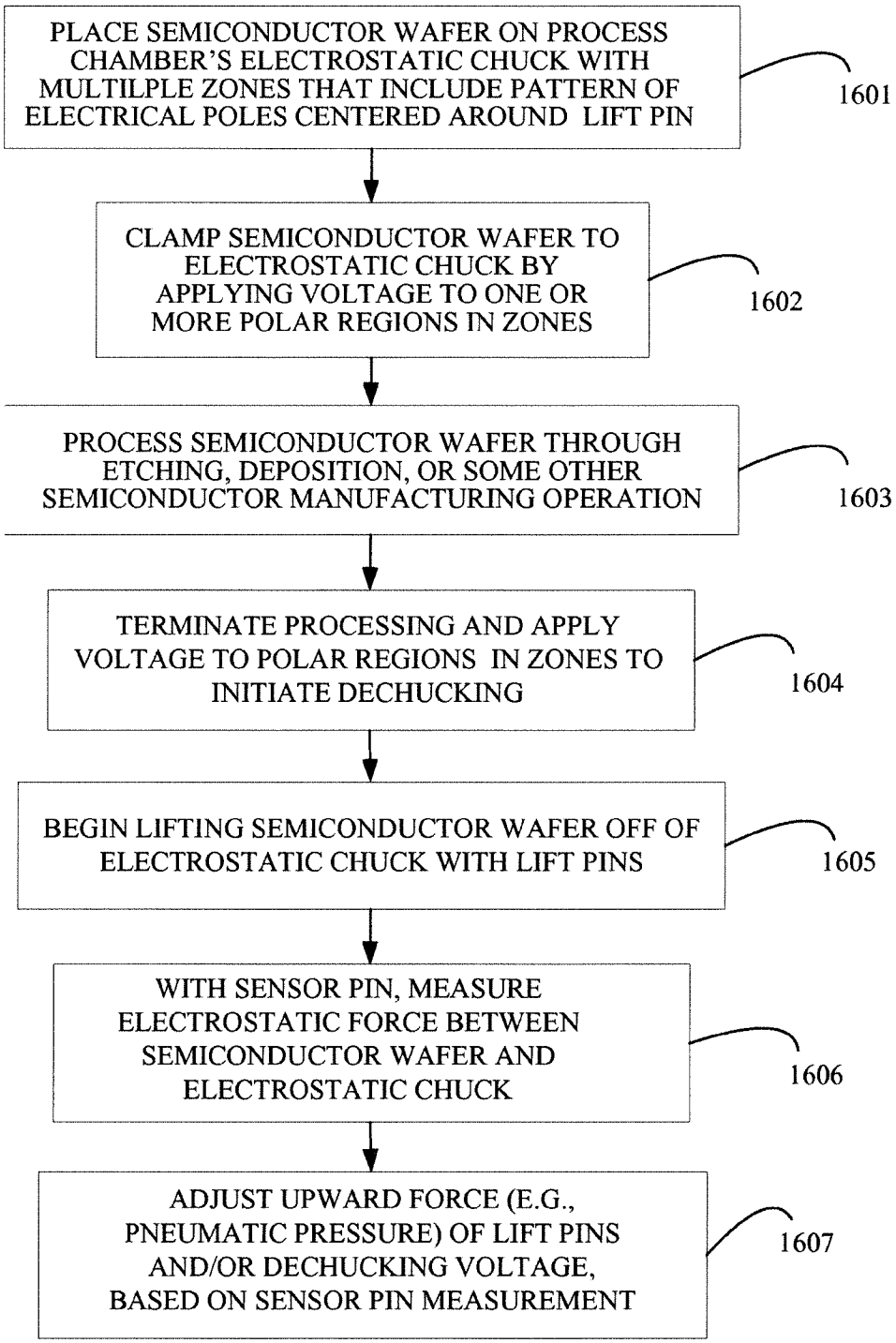

PLACE SEMICONDUCTOR WAFER ON PROCESS CHAMBER'S ELECTROSTATIC CHUCK WITH MULTILPLE ZONES THAT INCLUDE PATTERN OF ELECTRICAL POLES CENTERED AROUND LIFT PIN
1601
CLAMP SEMICONDUCTOR WAFER TO ELECTROSTATIC CHUCK BY APPLYING VOLTAGE TO ONE OR MORE POLAR REGIONS IN ZONES
1602
PROCESS SEMICONDUCTOR WAFER THROUGH ETCHING, DEPOSITION, OR SOME OTHER SEMICONDUCTOR MANUFACTURING OPERATION
1603
TERMINATE PROCESSING AND APPLY VOLTAGE TO POLAR REGIONS IN ZONES TO INITIATE DECHUCKING
1604
BEGIN LIFTING SEMICONDUCTOR WAFER OFF OF ELECTROSTATIC CHUCK WITH LIFT PINS
1605
WITH SENSOR PIN, MEASURE ELECTROSTATIC FORCE BETWEEN SEMICONDUCTOR WAFER AND ELECTROSTATIC CHUCK
1606
ADJUST UPWARD FORCE (E.G., PNEUMATIC PRESSURE) OF LIFT PINS AND/OR DECHUCKING VOLTAGE, BASED ON SENSOR PIN MEASUREMENT
1607

Figure 16

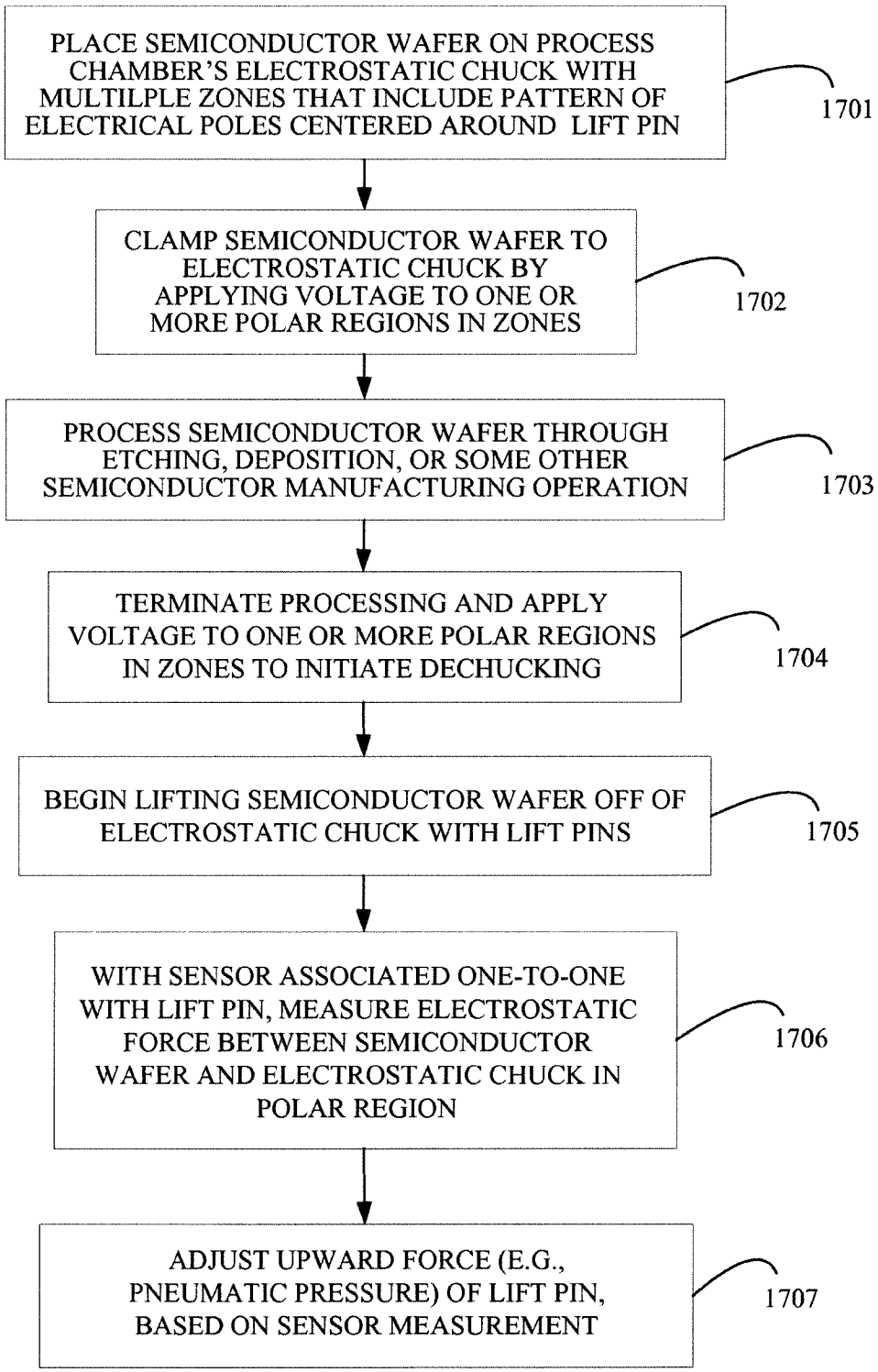

PLACE SEMICONDUCTOR WAFER ON PROCESS CHAMBER'S ELECTROSTATIC CHUCK WITH MULTILPLE ZONES THAT INCLUDE PATTERN OF ELECTRICAL POLES CENTERED AROUND LIFT PIN
1701
CLAMP SEMICONDUCTOR WAFER TO ELECTROSTATIC CHUCK BY APPLYING VOLTAGE TO ONE OR MORE POLAR REGIONS IN ZONES
1702
PROCESS SEMICONDUCTOR WAFER THROUGH ETCHING, DEPOSITION, OR SOME OTHER SEMICONDUCTOR MANUFACTURING OPERATION
1703
TERMINATE PROCESSING AND APPLY VOLTAGE TO ONE OR MORE POLAR REGIONS IN ZONES TO INITIATE DECHUCKING
1704
BEGIN LIFTING SEMICONDUCTOR WAFER OFF OF ELECTROSTATIC CHUCK WITH LIFT PINS
1705
WITH SENSOR ASSOCIATED ONE-TO-ONE WITH LIFT PIN, MEASURE ELECTROSTATIC FORCE BETWEEN SEMICONDUCTOR WAFER AND ELECTROSTATIC CHUCK IN POLAR REGION
1706
ADJUST UPWARD FORCE (E.G., PNEUMATIC PRESSURE) OF LIFT PIN, BASED ON SENSOR MEASUREMENT
1707

Figure 17

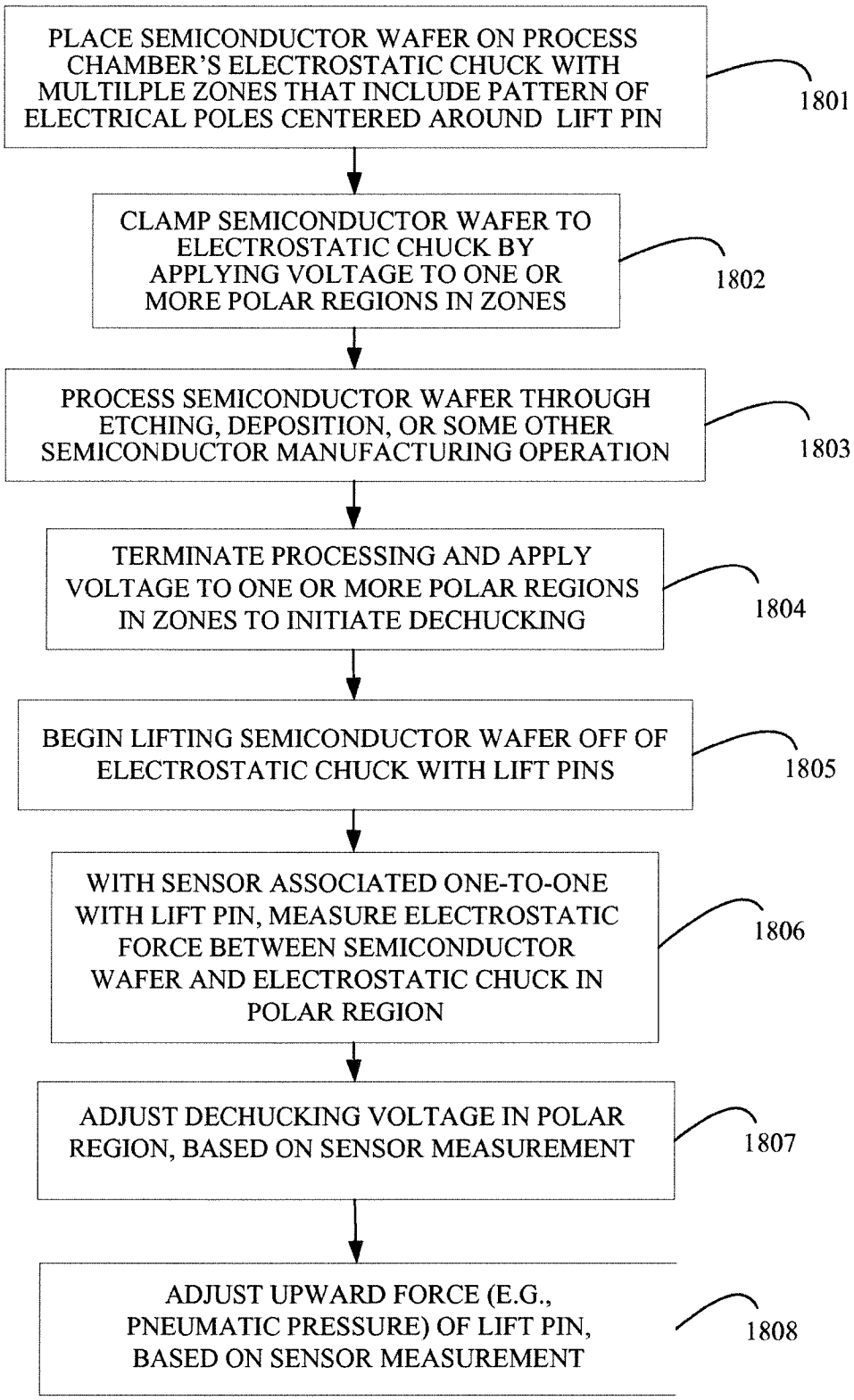

PLACE SEMICONDUCTOR WAFER ON PROCESS CHAMBER'S ELECTROSTATIC CHUCK WITH MULTILPLE ZONES THAT INCLUDE PATTERN OF ELECTRICAL POLES CENTERED AROUND LIFT PIN
1801
CLAMP SEMICONDUCTOR WAFER TO ELECTROSTATIC CHUCK BY APPLYING VOLTAGE TO ONE OR MORE POLAR REGIONS IN ZONES
1802
PROCESS SEMICONDUCTOR WAFER THROUGH ETCHING, DEPOSITION, OR SOME OTHER SEMICONDUCTOR MANUFACTURING OPERATION
1803
TERMINATE PROCESSING AND APPLY VOLTAGE TO ONE OR MORE POLAR REGIONS IN ZONES TO INITIATE DECHUCKING
1804
BEGIN LIFTING SEMICONDUCTOR WAFER OFF OF ELECTROSTATIC CHUCK WITH LIFT PINS
1805
WITH SENSOR ASSOCIATED ONE-TO-ONE WITH LIFT PIN, MEASURE ELECTROSTATIC FORCE BETWEEN SEMICONDUCTOR WAFER AND ELECTROSTATIC CHUCK IN POLAR REGION
1806
ADJUST DECHUCKING VOLTAGE IN POLAR REGION, BASED ON SENSOR MEASUREMENT
1807
ADJUST UPWARD FORCE (E.G., PNEUMATIC PRESSURE) OF LIFT PIN, BASED ON SENSOR MEASUREMENT
1808

Figure 18